Claims

1. In a transmission system comprising a transmitter and a receiver, a method of transmitting information symbols having a symbol rate (R) via a channel having a bandwidth (B), the method comprising:

defining transmission quality and channel characteristics;

in the transmitter, frequency spreading and time spreading the information symbols, and thereafter transmitting an information symbol signal;

upon receiving the transmitted information symbol signal in the receiver, adaptively de-spreading the information symbols and controlling transmission system gain in relation to the transmission quality and channel characteristics.

2. The method of Claim 1, wherein transmission system gain is controlled by varying symbol rate (R).

3. The method of Claim 1, further comprising the step of:

adjusting the frequency spread of the information symbols in relation to at least one parameter selected from a group of parameters consisting of transmitter power, bit error rate, and transmission speed.

4. The method of Claim 3, further comprising the step of:

adjusting the time spread of the information symbols in relation to at least one parameter selected from a group of parameters consisting of transmitter power, bit error rate, and transmission speed.

5. The method of claim 4, wherein frequency spreading of the information symbols comprises:

forming quasi Dirac pulses and filtering the quasi Dirac pulses, such that each information symbols is fully spread across channel bandwidth (B); and,

wherein time spreading of the information symbols comprises:

interleaving one or more information signals with a correlation signal.

6. The method of claim 5, wherein the correlation signal is a chirp pulse signal.

7. The method of claim 4, wherein at least one of transmitter power, bit error rate, and transmission speed is individually matched to a transmission system subscriber.

8. The method of claim 5, further comprising:

assessing channel characteristics using the transmitted information symbol signal.

9. The method of claim 8, further comprising:

reducing symbol rate (R) in relation to a constant channel bandwidth as determined by a channel characteristic assessment.

10. The method of claim 9, wherein frequency spreading of the information symbols further comprises:

forming a quasi Dirac pulse sequence in a first transmitter stage for each information symbol, regardless of the symbol rate; and,

band pass filtering the quasi Dirac pulse sequence in a second transmitter stage.

11. The method of claim 5, further comprising:
compresssing the information symbol signal in the receiver.

12. In a transmission system comprising a transmitter and a receiver, a method of transmitting information symbols via a channel having a bandwidth, the information symbols being transmitted in accordance with one or more transmission parameters selected from a group of parameters comprising transmission speed, bit error rate, and transmitter power, the method comprising:
determining a first priority transmission parameter;
assessing the channel transmission characteristics at the receiver;
communicating the assessed channel transmission characteristics to the transmitter before beginning transmission of the information symbols; and,
transmitting the information symbols while maintaining a predetermined value for at least the first priority transmission parameter.

13. The method of claim 12, further comprising:
where required in relation to the assessed channel transmission characteristics, adjusting transmission parameters other than the first transmission parameter in order to maintain the predetermined value of the first priority transmission parameter.

14. The method of claim 13, further comprising:

determining second and third priority transmission parameters.

15. The method of claim 14, further comprising:

determining for a particular transmission whether the transmission system will transmit voice or data.

16. The method of claim 15, further comprising:

upon determining that the transmission system will transmit voice, further determining that transmitter power is the first priority transmission parameter, transmission speed is the second priority transmission parameter, and bite error rate is the third priority transmission parameter; and,

upon determining that the transmission system will transmit data, further determining that bit error rate is the first priority transmission parameter, transmitter power is the second priority transmission parameter, and transmission speed is the third priority transmission parameter.

17. The method of claim 12, wherein information symbols are transmitted in a sequence of time slots, and wherein the method further comprises:

adjusting transmitter power on a time slot by time slot basis in relation to a determination of transmission system gain during each time slot.

18. The method of claim 17, further comprising:

defining within the transmission system an organization channel and a plurality of mutually independent message channels, each one of the plurality of message channels defining a corresponding sequence of time slots;

defining transmission frames, each frame having a frame length and comprising a sub-frame interval during which channel characteristics, including transmission system gain, are measured;

5   transmitting information symbols via a selected one of the plurality of message channels in relation to a transmission frame;

varying the time slots in the selected one message channel in accordance with measured channel character-

10   istics; and,

varying transmitter power on a time slot by time slot basis in accordance with transmission system gain.

19.   The method of claims 18 wherein individual

15   transmission system subscriber time slots in a transmission frame are arranged in accordance with their assigned transmitter power.

20.   The method according of claim 18, wherein

20   transmitter power in any one time slot is distributed over a plurality of overlapping chirp pulses.

21.   The method of claim 18, wherein information symbol spacing in a time slot for channel measurement

25   is set to be so large that adjacent chirp pulses do not overlap.

22.   The method of claim 19, further comprising:

for each transmission system subscriber, setting

30   logic parameters for a given message channel, the logic parameters including at least length of time slots, symbol rate within individual time slots, and transmitter power provided during individual time slots, in ac-

cordance with measured channel characteristics and in relation to subscriber-specific requirements.

23. The method of claim 4, wherein time spreading in the transmitter is accomplished using a dispersive filter having a suitable frequency/run-time characteristic.

24. The method of claim 23, wherein the dispersive filter in the transmitter and a corresponding filter in the receiver used for time-compression are implemented in the form of surface wave filters (SAW filters).

25. The method of claim 23, wherein the dispersive filter in the transmitter and a corresponding filter in the receiver used for time-compression are implemented in the form of charge-coupled device filters (CCD filters).

26. The method of claim 8, wherein channel assessment is made in the receiver in relation to a channel pulse response arising from the transmission of a time-compressed reference symbols.

27. The method of claim 26, further comprising:
synchronizing a symbol clock in the receiver in accordance the transmitted reference symbols.

28. The method of claim 5, wherein the correlation signal comprises a signal having an autocorrelation characteristic fulfilling the first Nyquist criterion.

29. The method of claim 6, wherein the chirp pulse signal is weighted with an absolute frequency sequence of a root Nyquist filter.

5   30. The method of claim 5 wherein the correlation signal is one selected from a group of correlation signals having characteristics determined by conditions external to the transmission of the information symbols.

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31. The method of claim 12, wherein the receiver comprises a Fractional Spaced Equalizer (FSE), and the method further comprises:

pre-emphasizing the information symbols at the
15 transmitter following channel assessment at the receiver and communication of the assessed channel transmission characteristics to the transmitter.

32. The method of claim 26, further comprising:
20 using an iterative process, calculating the channel pulse response in parametric form using one or more reflection coefficients;

determining multipath echo from the channel pulse response and subtracting the echo from the signal re-
25 ceived at an equalization stage in the receiver.